

**UNITED STATES DEPARTMENT OF COMMERCE****United States Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

211

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
-----------------	-------------	----------------------	---------------------

09/633,002 08/04/00 ISHIBASHI

K

000832
BAKER & DANIELS
111 E. WAYNE STREET
SUITE 800
FORT WAYNE IN 46802

IM22/0705

EXAMINER

MARKHAM, W

ART UNIT

PAPER NUMBER

1762

DATE MAILED:

07/05/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/633,002

Applicant(s)

ISHIBASHI, KEIJI

Examiner

Wesley D Markham

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-20 is/are pending in the application.
- 4a) Of the above claim(s) 17-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 11-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claims ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 18) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other: _____

DETAILED ACTION

Acknowledgement is made of applicant's preliminary amendment A, filed as paper #2 on August 4, 2000, in which a substitute title, abstract, and specification were submitted, Claims 1 – 10 were canceled, and Claims 11 – 20 were added to application serial # 09/633,002. Claims 11 – 20 are currently pending in the application, and an Office Action on the merits follows.

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 11 – 16, drawn to a method of removing a deposited film inside a chamber, classified in class 427, subclass 248.1.
 - II. Claims 17 – 20, drawn to a CVD apparatus, classified in class 118, subclass 723 R.
2. Inventions I and II are related as process and apparatus for its practice, respectively. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to practice another and materially different process, such as a process in which a deposition gas or gases is/are introduced through both apparatus inlets to form a deposited film inside the chamber without feeding any cleaning gas.

Art Unit: 1762

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Mr. Anthony Niewyk on June 26, 2001, a provisional election was made without traverse to prosecute the invention of Group I, Claims 11 – 16. Affirmation of this election must be made by applicant in replying to this Office action. Claims 17 – 20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. The examiner would like to note that the term, "hot element" in Claims 11 and 12 has been interpreted, in accordance with the applicant's specification, to mean simply an element (for example, a wire) that can be heated. In this case, the term "hot" has not been construed as a relative term, since the term is not used to describe a specific or relative temperature.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 11 – 12 and 15 – 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuyama (USPN 5,149,375) in view of Niino et al. (USPN 5,637,153).

8. Regarding Claims 11 – 12, Matsuyama teaches a CVD method and apparatus, the method comprising heating a hot element (Col.9, lines 33 – 37), supplying a material gas to a chamber (Cols. 18 – 21, Examples 4 and 5), contacting the material gas with the hot element to cause decomposition and/or activation of the material gas by the hot element (Col.19, lines 16 – 32), and forming a deposited film which comprises at least one element from the material gas on a substrate (Col.19, lines 11 – 15 and 40 – 42). In addition, Matsuyama teaches that the material for the hot element comprises platinum, which is selected for its heat resistance and reaction resistance (Col.9, lines 5 – 16). Matsuyama does not explicitly teach exhausting the chamber, supplying a cleaning gas to the chamber, contacting the cleaning gas with a heated hot element to decompose and/or activate the cleaning gas, allowing the activated cleaning gas to convert the deposited film into a gaseous substance, and removing the gaseous substance from the chamber. However, Matsuyama does teach that his method is used in the production of semiconductor devices (Col.1, lines 24 – 30). Matsuyama also teaches that it is desirable to form amorphous silicon films using his hot-filament CVD method (Col.19, lines 11 – 16). Niino et al. teach that, in the production of semiconductor devices using CVD, when amorphous silicon films are deposited on a substrate, the films also deposit undesirably on the interior surfaces of the reaction chamber as well as the interior surfaces of the chamber exhaust outlet (Col.1, lines 26 – 31 and 45 – 54, Col.2, lines 53

– 67, and Col.8, lines 9 – 14). Therefore, it would have been obvious to one of ordinary skill in the art to have a reasonable expectation that the amorphous silicon films produced in the hot-filament CVD process of Matsuyama would have also deposited undesirably on the walls of the reaction vessel as taught by Niino et al. Further, Niino et al. also teach that these undesirable films can peel and scatter inside the reaction chamber and adhere to the semiconductor wafer substrate(s), thereby decreasing the yield of the semiconductor wafers (Col.1, lines 45 – 52). In addition, Niino et al. teach that a highly reactive ClF_3 cleaning gas is used to etch and remove the deposited film from the inner surfaces of the reaction chamber without forming a plasma of the ClF_3 cleaning gas (Col.2, lines 24 – 34 and Col.3, lines 19 – 33). The ClF_3 cleaning gas of Niino et al. is activated by heat alone, not plasma. Niino et al. also teach exhausting the chamber before the deposition process, after the deposition process but before the cleaning process, and during the cleaning process to remove the cleaning gas / decomposed deposited film from the chamber (Col.20, lines 23 – 38, and Col.21, lines 34 – 36). It would have been obvious to one of ordinary skill in the art to utilize the cleaning process of Niino et al. in the hot-filament CVD process of Matsuyama with the reasonable expectation of successfully activating the cleaning gas using the hot-filament of Matsuyama and etching / removing the undesired film on the interior surface of the reaction chamber in a plasma free process as taught by Niino et al. In doing so, one of ordinary skill in the art would have had the reasonable expectation that the ClF_3 cleaning gas of Niino et al. would not have damaged the platinum hot element of Matsuyama, as Matsuyama teaches that platinum is chosen for use in the hot element

due to its corrosion resistance (Col.9, lines 13 – 16). Although it is not explicitly stated that the activated cleaning gas of Niino et al. converts the deposited film into a gaseous substance for removal, the “etching” of the deposited film performed by the ClF_3 cleaning gas inherently converts the deposited film to a gaseous substance (see, for example, Col.21, lines 34 – 42).

9. Matsuyama and Niino et al. teach all the limitations of Claims 15 – 16 as set forth in paragraph 8 above, including a method wherein the cleaning gas is a gas containing at least one of fluorine, chlorine, NF_3 , CF_4 , C_2F_6 , C_3F_8 , CCl_4 , C_2ClF_5 , ClF_3 , CClF_3 , SF_6 , and mixtures thereof. Specifically, Niino et al. teach a ClF_3 cleaning gas (Abstract).

10. Claims 13 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuyama (USPN 5,149,375) in view of Niino et al. (USPN 5,637,153) in further view of Iwasaki et al. (JP 03-226578).

11. Matsuyama and Niino et al. teach all the limitations of Claims 13 – 14 as set forth in paragraph 8 above, except a method wherein at least a part of a surface of an inner structure of the chamber is covered with platinum. However, Niino et al. does teach the the ClF_3 cleaning gas is highly reactive and can possibly etch and damage the interior surfaces of a reaction chamber (Col.2, lines 28 – 34). Iwasaki et al. teaches that it is desirable to coat the inner surfaces of a CVD chamber with a protective layer of platinum so that, when the inside of the device is cleaned with a fluorine-based gaseous etchant such as ClF_3 , the internal members are not corroded, and the device can be

used over a long period of time (Purpose, Constitution, and Col.2, paragraph 2, as verified by an oral translation by a USPTO translator). Therefore, it would have been obvious to one of ordinary skill in the art to coat the inner surface members of Matsuyama et al. with platinum as taught by Iwasaki et al. with the reasonable expectation of successfully preventing the members inside the chamber from being corroded by the ClF_3 cleaning gas of Niino et al. as taught by Iwasaki et al.

12. The examiner would like to note that the phrase, "inner structure of said chamber is covered with platinum" in Claims 13 – 14 has been interpreted to exclude structures comprised completely of platinum, such as the platinum hot elements of Matsuyama.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Sakyu et al. (USPN 6,235,951 B1) teaches that platinum covered reaction chambers are preferred when hydrogen fluoride or hydrogen chloride gases are present.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (703) 308-7557. The examiner can normally be reached on Monday - Friday, 7:30 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone numbers

Art Unit: 1762

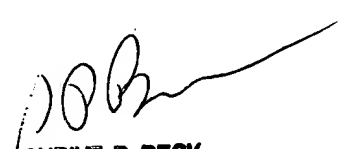
for the organization where this application or proceeding is assigned are (703) 305-5408 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Wesley D Markham
Examiner
Art Unit 1762



WDM
June 28, 2001



SHRIVE P. BECK
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700